

405 KAR 18:130. Disposal of excess spoil.

RELATES TO: KRS 350.090, 350.151, 350.410, 350.440, 350.465

STATUTORY AUTHORITY: KRS Chapter 13A, 350.028, 350.151, 350.465

NECESSITY, FUNCTION, AND CONFORMITY: KRS Chapter 350 in pertinent part requires the cabinet to promulgate rules and administrative regulations establishing performance standards for protection of people and property, land, water and other natural resources, and aesthetic values, during underground mining activities and for restoration and reclamation of surface areas affected by underground mining activities. This administrative regulation sets forth specific requirements for the location of areas used for the disposal of excess spoil materials and the design, construction, and inspection of fill structures composed of such materials.

Section 1. General Requirements. (1) General. Excess spoil shall be placed in designated disposal areas, within a permit area, in a controlled manner to:

(a) Minimize the adverse effects of leachate and surface water run-off from the fill on surface and ground water;

(b) Ensure mass stability and prevent mass movement during and after construction; and

(c) Ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use.

(2) Design certification.

(a) The fill and appurtenant structures shall be designed using current, prudent engineering practices by a qualified, registered professional engineer experienced in the design of earth and rock fills who shall certify the design of the fill and appurtenant structures.

(b) The fill shall be designed and constructed to attain a minimum long-term static safety factor of one and five-tenths (1.5). The foundation and abutments of the fill and all other features shall be sufficient to ensure stability of the fill and appurtenant structures under all stages and conditions of construction.

(3) Location. The disposal area shall be located on the most moderately sloping and naturally stable area available among those upon which, in the judgment of the cabinet, spoil could be placed in compliance with all applicable requirements of 405 KAR Chapters 7 through 24, and shall be placed, where possible, upon or above a natural terrace, bench, or berm if such placement provides additional stability and prevents mass movement.

(4) Stability.

(a) Stability analyses shall be performed by a qualified, registered professional engineer. Parameters used in the stability analyses shall be based upon adequate investigations of foundation and fill material, as approved by the cabinet, including field reconnaissance; subsurface investigations; and data obtained from laboratory analyses of such materials or, if approved by the cabinet, data obtained from other sources that yield results which ensure compliance with the applicable stability requirements of this administrative regulation. The analyses of foundation conditions shall take into consideration the effect of underground mine workings, if any exist in the area, upon the stability of the fill and appurtenant structures.

(b) If the toe of the fill rests on an area which has a natural land slope in excess of 2.8h:1v (thirty-six (36) percent) or such a lesser slope as may be designated by the cabinet based on local conditions, keyway cuts (excavations to stable bedrock) and/or rock toe buttresses shall be constructed to ensure stability of the fill. Stability analyses shall be performed in accordance with 405 KAR 8:040, Section 28 to determine the sizes of the rock toe buttresses and/or keyway cuts.

(5) Placement of excess spoil.

(a) Vegetative and organic materials shall be removed, either progressively or in a single set of operations, from the disposal area prior to placement of the excess spoil. Topsoil shall be removed,

segregated, and stored and/or redistributed in accordance with 405 KAR 18:050. If approved by the cabinet, vegetative material may be used as mulch or may be included in the topsoil to control erosion, promote growth of vegetation, or increase the moisture retention of the soil.

(b) Excess spoil shall be transported and placed in a controlled manner in horizontal lifts not exceeding four (4) feet in thickness (or less if required by the cabinet to achieve the density necessary to ensure mass stability and to prevent mass movement, to avoid adverse impacts on the rock underdrain or rock-core, or to minimize the formation of voids); concurrently compacted as necessary to ensure mass stability and to prevent mass movement during and after construction; graded so that surface and subsurface drainage is compatible with the natural surroundings; and covered with topsoil or substitute material in accordance with 405 KAR 18:050. The cabinet may approve designs which incorporate placement of excess spoil in lifts greater than four (4) feet in thickness if it is demonstrated to the cabinet's satisfaction in the application and certified by a qualified, registered professional engineer that the design ensures the stability of the fill in accordance with all applicable stability requirements of this administrative regulation and that the design complies with all other requirements of this administrative regulation.

(c)1. The final configuration of the fill shall be suitable for the approved postmining land use.

2. The top of the fill shall be graded no steeper than 20h:1v (five (5) percent) toward properly designed drainage channels in natural ground along the periphery of the fill. Surface run-off from the top surface of the fill shall not be allowed to flow over the outslope of the fill. The outslope of the fill shall not exceed 2H:1v (fifty (50) percent) or such a lesser slope as may be required by the cabinet to ensure stability or minimize erosion.

3. Terraces may be constructed on the outslope of the fill if required for stability, for control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. Terrace benches shall be graded with a three (3) to ten (10) percent slope toward the fill. The outslope between terrace benches shall not exceed 2h:1v (fifty (50) percent) or such a lesser slope as may be required by the cabinet to ensure stability or minimize erosion. Run-off shall be collected by a ditch along the intersection of each terrace bench and the outslope. This ditch shall route run-off to stabilized diversion channels and shall have a maximum slope that is no greater than 20h:1v (five (5) percent) unless a steeper slope is necessary for permanent roads in conjunction with an approved postmining land use and a steeper slope will not adversely affect the stability of the fill or result in excessive erosion.

(d) Impoundments shall not be allowed on the completed fill.

(e) Excess spoil that is acid-forming, toxic-forming, or combustible may be placed in excess spoil fills provided that it is disposed of in accordance with 405 KAR 18:060 and 405 KAR 18:190, Section 3 and provided further that the disposal plan to be used is approved by the cabinet as part of the permit application.

(6) Drainage control.

(a) The fill design shall include diversions and underdrains as necessary to control erosion, minimize water infiltration into the fill, and ensure stability except the cabinet may waive underdrain requirements if it is demonstrated to the cabinet's satisfaction in the application that underdrains are not necessary because the disposal area does not contain any springs, manmade or natural drainageways, or wet-weather seeps and because seepage of water due to precipitation will not adversely affect the stability of the fill. In no case, except for head-of-hollow fills with rock-core chimney drains approved pursuant to Section 3 of this administrative regulation, shall surface run-off from above the fill be diverted through or under the fill.

(b) Diversions associated with excess spoil fills and appurtenant structures shall comply with the applicable requirements of 405 KAR 18:080 and shall be designed and maintained to safely pass the peak run-off from a ten (10) year, twenty-four (24) hour precipitation event, except as provided in Sections 2, 3, and 4 of this administrative regulation and where flow from an intermittent or perennial

stream is diverted the design event shall be the 100 year, twenty-four (24) hour precipitation event.

(c) Underdrains shall be constructed of durable, nonacid-forming, and nontoxic-forming rock; shall be free of coal, clay, and nondurable material; and shall be designed and constructed using current, prudent engineering practices. The underdrain system shall be designed and constructed to carry, away from the fill, the maximum anticipated seepage of water due to precipitation and the maximum anticipated seepage and discharge from seeps and springs in the foundation of the disposal area and shall be protected from piping and contamination by a filter system designed and constructed to ensure proper long-term functioning of the underdrain using current, prudent engineering practices.

1. The minimum cross-sectional dimensions of the underdrain shall be as specified in Appendix A of this administrative regulation unless the applicant demonstrates in the application, through detailed analyses to the satisfaction of the cabinet, that alternative cross-sectional dimensions will provide adequate long-term capacity for drainage at the site. In constructing the underdrain, no more than ten (10) percent of the rock shall be less than twelve (12) inches in size and no single rock shall be larger than twenty-five (25) percent of the width of the segment of the underdrain in which the rock is located.

2. Underdrains shall be constructed of durable rock that meets the durability requirements of Section 4(2)(a)2 of this administrative regulation with the exception that, for shale material, the minimum SDI value necessary to demonstrate sufficient durability for underdrain material shall be ninety-five (95).

3. Adequate samples shall be collected at sufficient geographic and stratigraphic locations and shall be tested and analyzed pursuant to this paragraph to determine, to the satisfaction of the cabinet, the characteristics of all variations of materials to be used in the underdrains. The results of such tests and analyses shall be provided in the permit application.

4. Upon the request of the cabinet, the permittee shall, under the direction of a qualified, registered professional engineer, obtain adequate samples from the underdrain or other locations as necessary to demonstrate, to the satisfaction of the cabinet, compliance with this paragraph. Such samples shall be tested by a qualified laboratory and the results of such testing shall be analyzed by the qualified, registered professional engineer. The obtaining of samples, the testing, and the analyses shall be in the detail, scope, and time frame required by the cabinet to demonstrate, to the satisfaction of the cabinet, compliance with this paragraph. The results of such analyses shall be certified by the qualified, registered professional engineer under whose direction the samples were obtained and tested, and the results of the testing and the results of the analyses shall be submitted immediately to the department's appropriate regional office. The results of the testing and the results of analyses, or copies thereof, shall be reviewed by the qualified, registered professional engineer or specialist performing the inspections pursuant to Section 1(8) of this administrative regulation and shall be included in the certified report immediately following the analyses.

(d) In lieu of the rock underdrain requirements of paragraph (c) of this subsection, perforated pipe underdrains may be approved by the cabinet on a case-by-case basis; however, perforated pipe underdrains shall not be approved for fills of greater than 250,000 cubic yards volume nor where failure of the fill could result in blockage of a stream or significant damage to the health or safety of the public. Perforated pipe underdrains shall be corrosion resistant; shall have characteristics consistent with the long-term life of the fill; shall be designed and constructed using current, prudent engineering practices; shall be designed and constructed to carry, away from the fill, the maximum anticipated seepage of water due to precipitation and the maximum anticipated seepage and discharge from seeps and springs in the foundation of the disposal area; and shall be protected from clogging and contamination by a filter system designed and constructed to ensure long-term functioning of the perforated pipe underdrain using current, prudent engineering practices.

(7) Surface area stabilization. During and after construction of the fill and appurtenant structures, slope protection shall be provided to minimize surface erosion at the site of excess spoil disposal

and at the locations of appurtenant structures. All disturbed areas, including diversion channels that are not riprapped or otherwise protected, shall be revegetated upon completion of construction.

(8) Inspections. A qualified, registered professional engineer, or other qualified professional specialist under the direction of a professional engineer, shall periodically inspect the fill during construction. The professional engineer or specialist shall be experienced in the construction of earth and rock fills.

(a) Inspections of the fill site shall be made during critical construction periods as necessary to ensure compliance with this administrative regulation. Critical construction periods shall include at a minimum: foundation preparation including the removal of all organic material and topsoil; placement of underdrains and protective filter systems; installation of final surface drainage systems; completion of the final grading; and completion of the initial revegetating of the completed fill. In addition to the above, inspections of the fill site shall be made, beginning at the initial site-preparation phase of construction, at least once every three (3) months throughout construction of the fill, including during placement and compaction of fill materials.

(b) The qualified, registered professional engineer shall provide a certified report to the department's appropriate regional office within two (2) weeks after each inspection that the fill has been or is being constructed and maintained as designed and in accordance with the approved plan and this administrative regulation. The report shall address appearances of instability, structural weakness, and other hazardous conditions.

(c)1. The certified reports on the drainage system and protective filter shall include color photographs taken during and after construction of the underdrain and protective filter but before the drainage system is covered with excess spoil. If the underdrain system is constructed in phases, each phase shall be certified separately.

2. For situations in which excess durable rock spoil is placed in single or multiple lifts such that the underdrain system is constructed simultaneously with excess spoil placement by the natural segregation of dumped materials in accordance with Section 4 of this administrative regulation, color photographs shall be taken of the underdrain as the underdrain system is being formed.

3. The photographs accompanying each certified report shall be taken in adequate size and number and with enough terrain or other physical features of the site shown to provide a relative scale to the photographs and to specifically and clearly identify the site.

(d) A copy of each inspection report shall be retained at or near the mine site.

(9) Underground disposal. Excess spoil may be disposed of in underground mine workings but only in accordance with a plan approved by the cabinet and MSHA in accordance with the requirements for underground disposal of coal processing waste under 405 KAR 8:040, Section 27.

(10)(a) If approved by the cabinet, based on a demonstration to the satisfaction of the cabinet in the application that such disposal will have no adverse effect upon the stability of the fill, and if included as a condition of the permit, excess spoil may be disposed of in coal mine waste refuse piles in accordance with 405 KAR 16:140 or 405 KAR 18:140.

(b) Coal processing waste shall not be disposed of in fills designed and approved for excess spoil. Underground development waste may be disposed of in excess spoil fills if such disposal is specifically approved by the cabinet and is made a condition of the permit and if such underground development waste is:

1. Placed in accordance with 405 KAR 18:140, Section 4;
2. Demonstrated to be nontoxic-forming and nonacid-forming; and
3. Demonstrated to have no adverse effect upon the stability of the fill.

(11) Spoil resulting from face-up operations for underground coal mine development may be placed in steep slope areas on the downslope at the drift entry as part of a cut and fill structure if the structure is less than 400 feet in length (as measured generally parallel to the mine bench) and if the fill is designed and constructed in accordance with the requirements of this section.

Section 2. Valley Fills and Head-of-hollow Fills. Valley fills and head-of-hollow fills shall meet all of the requirements of Section 1 of this administrative regulation and the additional requirements of this section, except as provided in Sections 3 and 4 of this administrative regulation.

(1) A subdrainage system for the fill shall be constructed in accordance with Section 1(6)(c) or (d) of this administrative regulation and with the following:

- (a) Be installed along the natural drainageways;
- (b) Extend from the toe to the head of the fill; and
- (c) Contain lateral drains to each area of potential drainage or seepage.

(2) Surface water run-off from the area above the fill shall be diverted away from the fill and into stabilized diversion channels designed to pass safely the run-off from a 100 year, twenty-four (24) hour precipitation event or larger event specified by the cabinet. Surface run-off from the fill surface shall be diverted to stabilized channels off the fill which will safely pass the run-off from a 100 year, twenty-four (24) hour precipitation event. Diversion designs shall comply with the applicable requirements of 405 KAR 18:080.

Section 3. Rock-core Chimney Drains. (1) A rock-core chimney drain may be used in a head-of-hollow fill instead of the subdrain and surface run-off diversion system normally required, as long as the fill is not located in an area containing an intermittent or perennial stream. A rock-core chimney drain may be used in a valley fill if the fill volume does not exceed 250,000 cubic yards of material and if upstream drainage is diverted around the fill.

(2) The rock-core chimney drain shall be designed and constructed as follows:

(a) The fill shall have, along the vertical projection of the main buried stream channel or rill, a vertical core of durable rock at least sixteen (16) feet thick which shall extend from the toe of the fill to the head of the fill and from the base of the fill to the surface of the fill. A system of lateral rock underdrains shall connect this rock-core to each area of potential drainage or seepage in the disposal area. The underdrain system and the rock-core shall be designed and constructed to carry, away from the fill, the maximum anticipated seepage of water due to precipitation and the maximum anticipated seepage and discharge from seeps and springs in the foundation of the disposal area. Rocks used in the rock-core and underdrains shall meet the requirements of Section 1(6)(c) of this administrative regulation.

(b) A filter system to ensure the proper long-term functioning of the rock-core shall be designed and constructed using current, prudent engineering practices.

(c)1. The grading of the fill surface shall drain run-off away from the outslope of the fill and may drain run-off toward the rock-core. In no case, however, shall intermittent or perennial streams be diverted into the rock-core. The maximum slope of the top of the fill shall be 33h:1v (three (3) percent). Terraces on the fill shall be graded with a three (3) to five (5) percent slope toward the fill and a one (1) percent slope toward the rock-core.

2. A drainage pocket may be maintained at the head of the fill during and after construction to intercept and collect surface run-off and to discharge the run-off through or over the rock drain, if it is demonstrated to the satisfaction of the cabinet in the application and certified by a qualified, registered professional engineer that the stability of the fill will not be impaired. In no case shall this drainage pocket have a potential for impounding more than 10,000 cubic feet of water.

(3) The drainage control system shall be capable of safely passing the run-off from a 100 year, twenty-four (24) hour precipitation event or a larger event if specified by the cabinet.

Section 4. End-dumped Fills. The cabinet may approve the alternative method of disposal of excess durable rock spoil by gravity placement in single or multiple lifts provided the following conditions are met:

(1) Except as provided in this section, the requirements of Sections 1 and 2 of this administrative regulation are met.

(2)(a)1. The excess spoil is nontoxic-forming and nonacid-forming and consists of at least eighty (80) percent, by volume, of durable rock that is free of coal, clay, and nondurable material.

2. Durable rock means rock that does not slake in water and that is not reasonably expected to degrade to such a size or condition as to block, cause failure of, or otherwise impair or restrict the effectiveness of the internal drainage system. The cabinet shall consider rock to be durable if it is demonstrated, to the satisfaction of the cabinet in the application, that the rock has an SDI value of ninety (90) or greater as determined by the Kentucky Department of Transportation "Method for Determination of Slake Durability Index" (Kentucky Method 64-513-79). The cabinet may accept other test methods of demonstrating that rock is durable if it is demonstrated to the satisfaction of the cabinet that the alternative test methods yield equivalent measure of durability based upon correlation of results with Kentucky Method 64-513-79.

3. Adequate samples shall be collected at sufficient geographic and stratigraphic locations and shall be tested and analyzed pursuant to this subsection to determine, to the satisfaction of the cabinet, the characteristics of all variations of materials to be placed in the end-dumped fill. The results of such tests and analyses shall be provided in the permit application.

(b) All noncemented and poorly cemented shale, clay, soil, and nondurable excess spoil materials disposed of in the fill shall be distributed, to the satisfaction of the cabinet, within the fill by selective dumping or other adequate methods of placement to avoid localized concentrations of nondurable materials which would adversely affect the stability or internal drainage of the fill.

(3) The fill shall be designed and constructed to attain a minimum long-term static safety factor of one and five-tenths (1.5) and a minimum earthquake safety factor of one and one-tenth (1.1).

(4) The underdrain system may be constructed simultaneously with excess spoil placement by the natural segregation of dumped materials provided that the resulting underdrain system is capable of carrying, away from the fill, the maximum anticipated seepage of water due to precipitation and the maximum anticipated seepage and discharge from seeps and springs in the foundation of the disposal area and provided that the other requirements for drainage control are met. For situations (such as the dumping of fill material from an insufficient height or on an insufficient slope) in which, in the judgment of the cabinet, the natural segregation of dumped materials will not form an adequate underdrain system, the underdrain system shall be separately constructed in accordance with Section 1(6) of this administrative regulation.

(5) Upon the request of the cabinet, the permittee shall, under the direction of a qualified, registered professional engineer, obtain adequate samples from the fill or other locations as necessary to demonstrate, to the satisfaction of the cabinet, compliance with this section. Such samples shall be tested by a qualified laboratory and the results of such testing shall be analyzed by the qualified, registered professional engineer. The obtaining of samples, the testing, and the analyses shall be in the detail, scope, and time frame required by the cabinet to demonstrate, to the satisfaction of the cabinet, compliance with this section. The results of such analyses shall be certified by the qualified, registered professional engineer under whose direction the samples were obtained and tested, and the results of the testing and the results of analyses shall be submitted immediately to the department's appropriate regional office. The results of the testing and the results of analyses, or copies thereof, shall be reviewed by the qualified, registered professional engineer or specialist performing the inspections pursuant to Section 1(8) of this administrative regulation and shall be included in the certified report immediately following the analyses.

(6) The surface drainage control system shall be designed and constructed in accordance with Sections 1 and 2 of this administrative regulation except that in all situations surface water run-off from areas adjacent to and above the fill and any appurtenant structures shall not flow onto the fill and shall be diverted into stabilized diversion channels designed to meet the applicable require-

ments of 405 KAR 18:080 and to safely pass the run-off from a 100 year, twenty-four (24) hour precipitation event.

Section 5. Disposal on Existing Benches. (1) If approved by the cabinet, excess spoil may be disposed of on preexisting benches that have not been reclaimed to the standards of 405 KAR and for which there is no continuing responsibility to reclaim to such standards, provided that all of the requirements set forth in Sections 1(1), (2)(a), (4) through (8) and (10) of this administrative regulation and the requirements of this section are met.

(a) Excess spoil shall be placed only on the solid portion of the preexisting bench.

(b) The excess spoil shall be placed in horizontal lifts, concurrently compacted as necessary to ensure mass stability and prevent mass movement with a long-term static safety factor of one and three-tenths (1.3), and graded to allow surface and subsurface drainage compatible with the natural surroundings. The final graded slopes shall not exceed 2h:1v (fifty (50) percent) except the cabinet may approve steeper slopes which provide a minimum long-term static safety factor of one and three-tenths (1.3), provide adequate control over erosion, and closely resemble the surface configuration of the land prior to mining.

(c) The preexisting bench shall be backfilled and graded to:

1. Achieve the most moderate slope possible which does not exceed the angle of repose; and
2. Eliminate the highwall to the maximum extent technically practicable.

(2) Gravity transport of excess spoil.

(a) Disposal of excess spoil from an upper actively mined bench to a lower preexisting bench by means of gravity transport may be approved by the cabinet if the applicant identifies the gravity transport courses on a map in the permit application and the applicant demonstrates, to the satisfaction of the cabinet, that the plan for gravity transport will minimize hazards to the environment and to the health and safety of the public and that the plan ensures that damage between benches and downslope of the preexisting bench will be minimized if spoil moves in an unapproved manner during activities related to the disposal of the spoil or after placement of the spoil on the preexisting bench.

(b) The disposal of material in accordance with this subsection shall comply with the following:

1. All excess spoil placed on the lower bench by gravity transport, including the spoil immediately below the points of gravity transport, shall be rehandled and placed as required under subsection (1) of this section. Spoil remaining on the lower bench from prior operations need not be rehandled unless such rehandling is necessary to ensure stability of the fill.

2. A safety berm shall be constructed on the solid portion of the lower bench prior to gravity transport of the excess spoil to the lower bench. The safety berm shall be of sufficient height, width, and length to prevent the gravity transported spoil from moving off the lower bench to the downslope. If there is insufficient material from previous operations on the lower bench to construct the safety berm, only that amount of excess spoil necessary for construction of the safety berm may be gravity transported to the lower bench prior to construction of the safety berm. The safety berm shall be removed during final grading operations.

3. Excess spoil shall not be allowed on the downslope below the upper bench and above the highwall of the preexisting bench except on designated gravity transport courses properly prepared according to 405 KAR 18:050. Upon completion of the fill, no excess spoil shall be allowed to remain on the designated gravity transport courses between the two (2) benches and each transport course shall be reclaimed in accordance with the applicable requirements of this chapter.

Section 6. Disposal of Underground Development Waste. Underground development waste shall be disposed of in accordance with the coal mine waste requirements of 405 KAR 18:140 and 405 KAR 18:160 as applicable.

Section 7. Applicability of Amendments to this Administrative Regulation. (1) Any excess spoil fill on which the final grading is conducted prior to the effective date of amendments to this administrative regulation shall, in lieu of the requirements of the amendments, comply with the requirements which preceded the amendments, the approved permit application, and the conditions of permit issuance.

(2) Any excess spoil fill in a construction phase beyond initial site preparation prior to ninety (90) days following the effective date of amendments to this administrative regulation shall, beginning on the effective date of these amendments, comply with all provisions of this administrative regulation as amended, except that for situations in which any requirement of an amendment to this administrative regulation would affect the design and construction of the fill to the extent that the design plans previously approved in the permit would have to be revised, such requirement shall not apply and the fill may be constructed in accordance with the previously approved design plans. However, the permittee may, if desired, apply for a permit revision in accordance with 405 KAR 8:010, Section 20 to modify the design of the fill to comply with the amendments to this administrative regulation.

(3) Any excess spoil fill for which construction begins on or after the 90th day following the effective date of amendments to this administrative regulation shall comply with all provisions of this administrative regulation as amended. If necessary in order to comply with this requirement, the permittee shall obtain a permit revision in accordance with 405 KAR 8:010, Section 20 prior to initial preparation of the fill site.

(4) With regard to any excess spoil fill approved in a permit issued prior to the effective date of these amendments, the permittee shall not be required to have slake durability index tests conducted solely for the purpose of including the results of such tests in the permit application; however, the permittee shall have such tests performed if required by the cabinet under Section 1(6)(c)4 or Section 4(5) of this administrative regulation. This exemption shall not apply to any such excess spoil fill approved in a permit issued prior to the effective date of these amendments for which construction begins on or after one (1) year following the effective date of these amendments. (8 Ky.R. 1571; Am. 9 Ky.R. 714; eff. 1-6-83; 11 Ky.R. 1856; 12 Ky.R. 198; eff. 8-13-85.)

Appendix A of 405 KAR 18:130			
Minimum Drain Segment Cross-Sectional Dimensions			
Total cumulative volume of fill material to be drained by segment	Predominant type of fill material	Minimum size of drain segment in feet	
		Width	Height
Less than 1,000,000 yd ³	Sandstone	10	4
	Shale	16	8
More than 1,000,000 yd ³	Sandstone	16	8
	Shale	16	16

The underdrain may be divided into segments for purposes of determining required dimensions of the individual drain segments. Each segment will drain the volume of fill overlying the segment plus carry the water drained to the segment from areas of the fill located upstream of the segment.

Where the cumulative volume of the fill material to be drained by a segment is less than 1,000,000 yd³, the smaller dimension may be used.